INSTRUCTION BOOK

and

OPERATING MANUAL

CITI-FONE SS

LICENSE REQUIREMENTS

Federal Communications Commission form 505 must be filled out and submitted to the Commission at Washington, D.C., to obtain the station and operators license necessary for the operation of this equipment.

Obtain and read Part 95 of the F.C.C. rules and regulations before filling out form 505 for your license. A copy of Part 95 may be obtained from the Superintendent of Documents, Government Printing Office, Washington 25, D.C.

Before operating this equipment you must obtain and have in your possession, your station license with assigned call numbers issued by the F.C.C. and a copy of Part 95 of the rules and regulations. Failure to comply with the Commission's rules and regulations is a Federal offense.

Any adjustments or repairs concerned with the frequency controlling circuits and/or transmitter crystals of this equipment must be made only by persons having in their possession a valid First or Second Class Radiotelegraph or Radiotelephone license issued by the Federal Communications Commission.

CERTIFICATION

The Multi-Elmac Company of Oak Park, Michigan certifies that all Citi-Fones meet the F.C.C. requirements under Part 95 of the Commissions rules and regulations regarding frequency tolerance, stability, modulation, power input, and harmonic radiation.

MULTI-ELMAC COMPANY

OAK PARK, MICHIGAN 48237

FORM #M200-R-964

LITHO IN U.S.A.

YOUR CITI-FONE SS IS DESIGNED FOR FLEXIBILITY, IS RUGGEDLY CONSTRUCTED AND INCORPORATES THE LATEST PROVEN TECHNIQUES IN THE ART OF TWO-WAY RADIO COMMUNICATION.

TO INSURE OPTIMUM PERFORMANCE AND MATCHING TO YOUR ANTENNA INSTALLATION; THE SECTIONS UNDER "OPERATION" SHOULD BE CAREFULLY OBSERVED PRIOR TO OPERATION OF THE "CITI-FONE".

CITI-FONE SS/6 or CITI-FONE SS/12

SPECIFICATIONS

RECEIVER: Superheterodyne, crystal controlled, with tuned R.F. amplifier and two (2) I.F. amplifiers. Sensitivity: 0.5 microvolts for 10:1 S+N/N ratio. Selectivity: 6DB down for 7 Kc. total bandpass and 40 DB down for 20 Kc. total bandpass. Delayed AVC. Noise Limiter: Automatic series gate type. Squelch: Noise-immune type wih sensitivity 0.1 microvolts above threshold noise level to completely open squelch. Audio Output: 2 watts with less than 10% harmonic distortion. Panel Meter: "S" meter in receive mode, S9 equals 50 microvolts R.F. signal input.

TRANSMITTER: 5 watts input (FCC Maximum). Modulation: High level plate modulation. Output Circuit: PI network for 50 ohm line. Panel Meter: Relative R.F. output indicator in the transmit mode.

POWER SUPPLY: Dual purpose for operation from D.C. source or A.C. source. Power supply is the voltage doubler type and uses silicon diode rectifiers.

GENERAL: The MULTI-ELMAC COMPANY "Citi-Fone" SS is a combination receiver, transmitter and dual purpose power supply fabricated into a single enclosure. The equipment is designed for low power two-way radio communication in the Class "D" Citizens-band of frequencies.

The Citi-Fone SS incorporates 23 channel crystal controlled transmit and receive operation. Crystal synthesis techniques are used to derive the 23 transmit and 23 receive channels with the use of eleven crystals for complete coverage of the Class "D" Citizens Radio Service.

Distance of communication over which these units are effective depends upon terrain, local noise conditions, type of antennas used and quality of antenna installation.

The Citi-Fone SS is designed for use with most commercially available antennas. Specific antenna types, location and installation information should be obtained from your CB dealer.

POWER REQUIREMENTS:
Transmit: 6 volts DC at 8 amperes, 12 volts DC at 4 amperes, or 115 volts AC at 48 watts intermittent.
Receive: 6 volts DC at 6.4 amperes, 12 volts DC at 3.2 amperes, or 115 volts AC at 38 watts continuous.

FREQUENCY COVERAGE: Single control, twenty-three (23) channel crystal controlled transmit and receive operation covering 26.965 Mc. to 27.255 Mc. Class "D" frequencies.

FEATURES: Single panel control for 23 channel selection with illuminated channel indicator. Illuminated panel "S" meter and relative R.F. output indicator. Noise-immune squelch. Delayed AVC. Receiver adjustable $\pm$3 Kc. from center channel frequency. Automatic series gate type noise limiter. Microphone with retractable coiled cord and quick disconnect plug. A.C. and D.C. operation.

EQUIPMENT SUPPLIED: One Citi-Fone SS/6 or Citi-Fone SS/12 ready to operate with all crystals for 23 channel operation, microphone and hanger, A.C. and D.C. power cords, mounting bracket and hardware.

TUBE COMPLEMENT

V-1	6DK6	receiver R.F. Amplifier pentode	
V-2 a	6EA8	receiver second mixer pentode	
b	6EA8	receiver-transmitter crystal oscillator triode	
V-3	6BJ6	receiver 1st IF amplifier	
V-4	6BJ6	receiver 2nd IF amplifier	
V-5	6AL5	receiver Detector, A.N.L., and A.V.C.	
V-6	6EJ7	receiver 1st Audio amplifer, squelch controlled; transmitter microphone pre-amplifier	
V-7 a	6GW8	receiver audio output amplifier	pentode
		transmitter modulator	pentode
V-7 b	6GW8	squelch control tube	triode
V-8 a	6BH8	transmitter crystal oscillator	triode
V-8 b	6BH8	transmitter R.F. driver	pentode
V-9	6AQ5	transmitter R.F. final amplifier	
V-10 a	6EA8	receiver variable oscillator	triode
V-10 b	6EA8	receiver-transmitter mixer	pentode

SEMI-CONDUCTOR COMPLEMENT

D-1	DR1520	Delayed AVC detector
D-2	1N34	R.F. output detector
D-3, D-4	VB-500	Power supply rectifiers

CLASS "D" CITIZENS-BAND CHANNELS AND FREQUENCY:

Channel Number	Frequency	Channel Number	Frequency
1	26.965 Mc.	13	27.115 Mc.
2	26.975 Mc.	14	27.125 Mc.
3	26.985 Mc.	15	27.135 Mc.
4	27.005 Mc.	16	27.155 Mc.
5	27.015 Mc.	17	27.165 Mc.
6	27.025 Mc.	18	27.175 Mc.
7	27.035 Mc.	19	27.185 Mc.
8	27.055 Mc.	20	27.205 Mc.
9	27.065 Mc.	21	27.215 Mc.
10	27.075 Mc.	22	27.225 Mc.
11	27.085 Mc.	23	27.255 Mc.
12	27.105 Mc.		

INSTALLATION

GENERAL: The Citi-Fone SS is completely wired, has all tubes in place, all crystals installed and is ready for operation as it leaves the factory. However, the appropriate power cord has to be connected between the Citi-Fone and the power source, and a suitable antenna system must be provided.

Best results will be realized if the installation is performed by competent, qualified persons. It is recommended that the tuning of the Citi-Fone SS be checked at the installation, to insure optimum output and efficiency. Tuning adjustments are covered under "SIGNAL STRENGTH METER."

One of the power cords supplied is for either 6 or 12 volts DC operation and is fitted with a plug to be inserted into the cigar lighter receptacle of the vehicle. Be sure that the battery voltage of the vehicle is the same as that of the Citi-Fone. The voltage that the Citi-Fone is wired for is stamped on the rear of the cabinet. The other cord supplied is for 115 volts AC operation. This cord is easily identified by the standard 115 volt plug attached to one end. To convert from AC to DC operation simply exchange cords. For permanent DC installation it is recommended that the power cord be wired direct to the battery. Since a longer wire is normally required, it is recommended that a heavier gauge wire be used. Be certain that the power cord is wired properly if the plug is removed.

MOUNTING: The handle affixed to the Citi-Fone also serves as a mounting bracket. For mobile installations the handle is easily secured to the bottom of the vehicle dash-board. There are two holes provided in the handle for this purpose. The handle may be removed from the cabinet by removing the knurled thumb screws in the side of the cabinet. When used at a fixed or base station the handle can be rotated so it is under the Citi-Fone to act as a support to hold the unit in an inclined position.

ANTENNA: The antenna system is very important and can make the difference between a successful and poor two-way radio communication system. Most efficient communications will result when the antenna is a 52 ohm impedance at resonance and 52 ohm transmission line is used for lead-in. An adapter, (G.C. #29-782), is supplied to adapt the type PL-259 co-ax plug to the Citi-Fone antenna jack.

NOISE: Normally, noise should not be a problem in the Citi-Fone. However, in mobile installations, it is not uncommon to experience trouble due to ignition noise, generator and voltage regulator hash, or wheel and tire static generated by the vehicle. The disturbing effect created by these sources can be practically eliminated by the proper use of noise suppressors, by-pass capacitors, front wheel static collectors, and if necessary, anti-static powder can be inserted into the tires through the valve stems.

OPERATION

When the Citi-Fone is properly installed actual operation is quite simple and should not present any problems.

VOLUME CONTROL AND SWITCH: The Citi-Fone is turned on by rotating the volume control knob, located in the lower left of the control panel, in a clockwise direction until a click is heard. Continuing the rotating of this knob in a clockwise direction will increase the volume level of the received signal.

SQUELCH CONTROL: This control, located to the right and below the channel selector, is used to quiet the receiver when there is no actual RF signal on the air. It is imperative that the operator understands the proper operation of this control. There is no impairment to the reception of messages, including those from very weak stations, when this control is properly adjusted. Adjust as follows: set the volume control to a comfortable listening level with the squelch control counterclock-

wise. At a time when there is no signal on the air, advance the control to the point where the receiver becomes quiet. DO NOT ADVANCE THE CONTROL MORE THAN ABOUT 5 DEGREES BEYOND THIS POINT. Advancing of the squelch control beyond this point of quieting will result in the necessity of the transmitted signal from a distant location to be closer or stronger to open the squelched receiver. This fact is of particular importance when operating a mobile unit, since the vehicle will be traveling to areas of various noise levels. It is advisable that the operators of mobile units be made aware of the proper operation of the "Squelch" control, so that maximum range may be realized in the two-way communications system.

CHANNEL SELECTOR: The channel selector switch is located at the top center of the control panel. This switch selects any one of twenty-three pre-set channel frequencies. Both transmitting and receiving channels are selected simultaneously by this control. Remember, any station with which you wish to communicate must be on the same frequency as your Citi-Fone.

TUNE CONTROL: The control is mounted on the front panel and is used to adjust the receiver plus or minus 3 kilocycles from the center of the channel frequency. Normally, this control is left with the marker set at the zero position. To facilitate reception of a station operating slightly off the received center frequency the tune control can be adjusted in either direction.

SIGNAL STRENGTH METER: The panel mounted meter gives a visual indication of the strength of the signal being received. The meter is calibrated in "S" units to S9. The S9 reading indicates a signal strength of 50 microvolts at the antenna terminal. Stronger signals will indicate to as high as the 40 DB mark depending on the strength of the signal.

When transmitting, the meter is automatically switched and registers the relative power output of the transmitter.

The readings on the meter can be used to adjust the Citi-Fone receiver and transmitter sections to the antenna for optimum performance.

The two adjustments, one for receiving and one for transmitting, are accessible through the holes in the bottom of the enclosure.

To peak the Citi-Fone on receiving, locate the #603 T1 coil with reference to drawing #1077. Tune in a steady, non fading, signal in the center of the tuning range between channels 8 and 16. With the aid of a GC 8606, or similar, hex alignment tool, adjust the core of the #603 coil for maximum "S" meter reading.

The transmitter section is peaked to the antenna by adjusting L5. Select a transmit channel preferably near the center of the Citizens-band. Press the push-to-talk microphone switch and carefully adjust L5 for maximum meter reading.

NOTE: A peak reading of the meter will correspond to maximum transmitter output only when the feed line impedance is flat or correctly terminated to the antenna. The final adjustment to L5 should always be accomplished with the aid of a Field Strength Meter.

METER ZERO-SET: Occasionally, after a tube change or after several hundred hours of operation, it may become necessary to reset the meter pointer to the zero mark on the meter scale.

The adjustment for zeroing the meter is accessible through the hole in the left side of the enclosure. For location refer to drawing #1077.

Allow the Citi-Fone to warm up for a few minutes. Disconnect the antenna lead. With a small screwdriver, turn the adjustment in either direction until the meter pointer rests on zero. When the antenna is connected, the meter will normally read partly upscale due to antenna and other extraneous noise.

ACCESSORY SOCKET: The female octal socket mounted on the rear of the Citi-Fone SS is wired and ready for use with the Multi-Elmac "Tone-Guard System" (optional at extra cost).

MICROPHONE: The microphone and the push-to-talk switch located on the side of the microphone are all that have to be operated after the volume control, squelch, and channel selector adjustments have been made.

To talk to another station merely press the button on the side of the microphone and speak into the microphone. Best results will be obtained when speaking in a normal voice with the microphone held about four inches from your lips and at a slight angle. Do not allow air to pass directly into the microphone when you are speaking as this will cause a rushing or whistling noise to be heard at the receiving end of the two-way installation. Do not shout into the microphone as this will cause distortion in the transmitted speech and make it very difficult for the other party to understand you.

REMEMBER: The button on the microphone must be pressed when you wish to speak and must be released to listen.

MAINTENANCE

The Citi-Fone should provide years of reliable operation with a minimum amount of service. The entire circuit has been designed in such a manner that no components are working near their maximum ratings.

ONCE A YEAR PREVENTIVE MAINTENANCE CHECKUP IS STRONGLY RECOMMENDED.

A once a year checkup will insure that the Citi-Fone SS is functioning properly and allow the service technician to find troubles before they create damage that could result in costly repairs. Also, transmit crystals can be checked to insure on frequency operation. The individual owner of the equipment is responsible for the frequency of the transmitter according to FCC rules. However, only those persons having a valid first or second class radio telephone operators license are qualified to service the frequency determining portions of any Citizen's Band equipment.

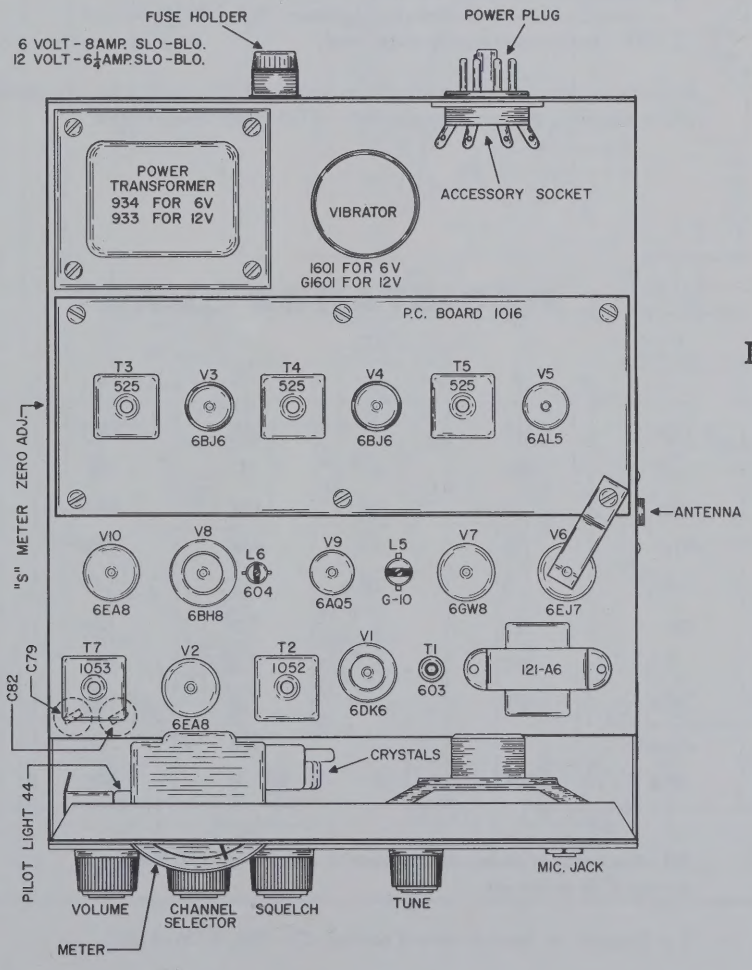
In the event it is deemed necessary to return the equipment to the factory for service it must be done in the following manner. First: Obtain authorization from the factory. Instructions will then be forwarded as to how and where the equipment is to be returned. Always specify the name of the equipment, the model number, serial number, and the nature of the complaint in any correspondence regarding your unit.

Most component parts used in the Citi-Fone are standard and readily available at the nearest electronic supply house. Any special components can be obtained from the factory by submitting information regarding part description, circuit location and model number.

AMPEREX TUBES ARE RECOMMENDED FOR REPLACEMENT OF THE 6EJ7 and 6GW8 TUBES.

CAUTION: In the event it becomes necessary to convert the Citi-Fone from a 6 volt D.C. unit to a 12 volt D.C. unit the following items must be changed.

1. Change the vibrator. #1601 is for 6 volts, #G1601 is for 12 volts.
2. Change the filament connections as shown on the schematic diagram.
3. Change the power transformer. #934 is for 6 volts.
   #933 is for 12 volts.
4. Change the fuse. 8 ampere slo-blo for 6 volt.
   6.25 ampere slo-blo for 12 volt.
5. Indicate this change on the rear of the cabinet.



DRWG. #1077

VOLTAGE CHART

Pin #	1	2	3	4	5	6	7	8	9
V1	DAVC	.9	6 ac	12 ac	220	82	0	-	-
V2T	120	0	0	0	6 ac	0	.14	0	-5.5
V2R	120	0	167	0	6 ac	205	4.7	0	-5.9
V3	AVC	1.6	0	6 ac	210	80	0	-	-
V4	AVC	1.7	0	6 ac	210	88	0	-	-
V5	0	-1.4	0	6 ac	0	0	-.08	-	-
V6T	.5	0	.5	0	6 ac	-	76	31	.5
V6R a	36	31 VTVM	36	0	6 ac	-	164	142	36
V6R b	38	-6.7	38	0	6 ac	-	216	186	38
V7T	-6.3	-4.5	233	6 ac	12 ac	205	6.3	0	0
V7R a	AVC	5.1	230	6 ac	12 ac	220	6.1	0	33 VTVM
V7R b	-16	-15	230	6 ac	12 ac	220	6.1	0	-6.9 VTVM
V8T	.07	-.02	138	12 ac	6 ac	2.7	0	184	226
V8R	0	-.75	0	12 ac	6 ac	0	-1.3	0	0
V9T	-2.5*	0	6 ac	12 ac	162	162 ‡	-2.5*	-	-
V9R	0	32	6 ac	12 ac	220	220	0	-	-
V10T	0	0	168	0	6 ac	197	5	0	-.1
V10R	152	0	168	0	6 ac	202	4.7	.06	-3.5

LINE VOLTAGE - 120vac
T - Transmit
R - Receive
Ra - Measurements made with squelch control CCW.
Rb - Measurements made with squelch control CW.
* - Measure at test point junction between 1K & 15K (16:1 ratio)
‡ - RF Choke in series with meter lead.

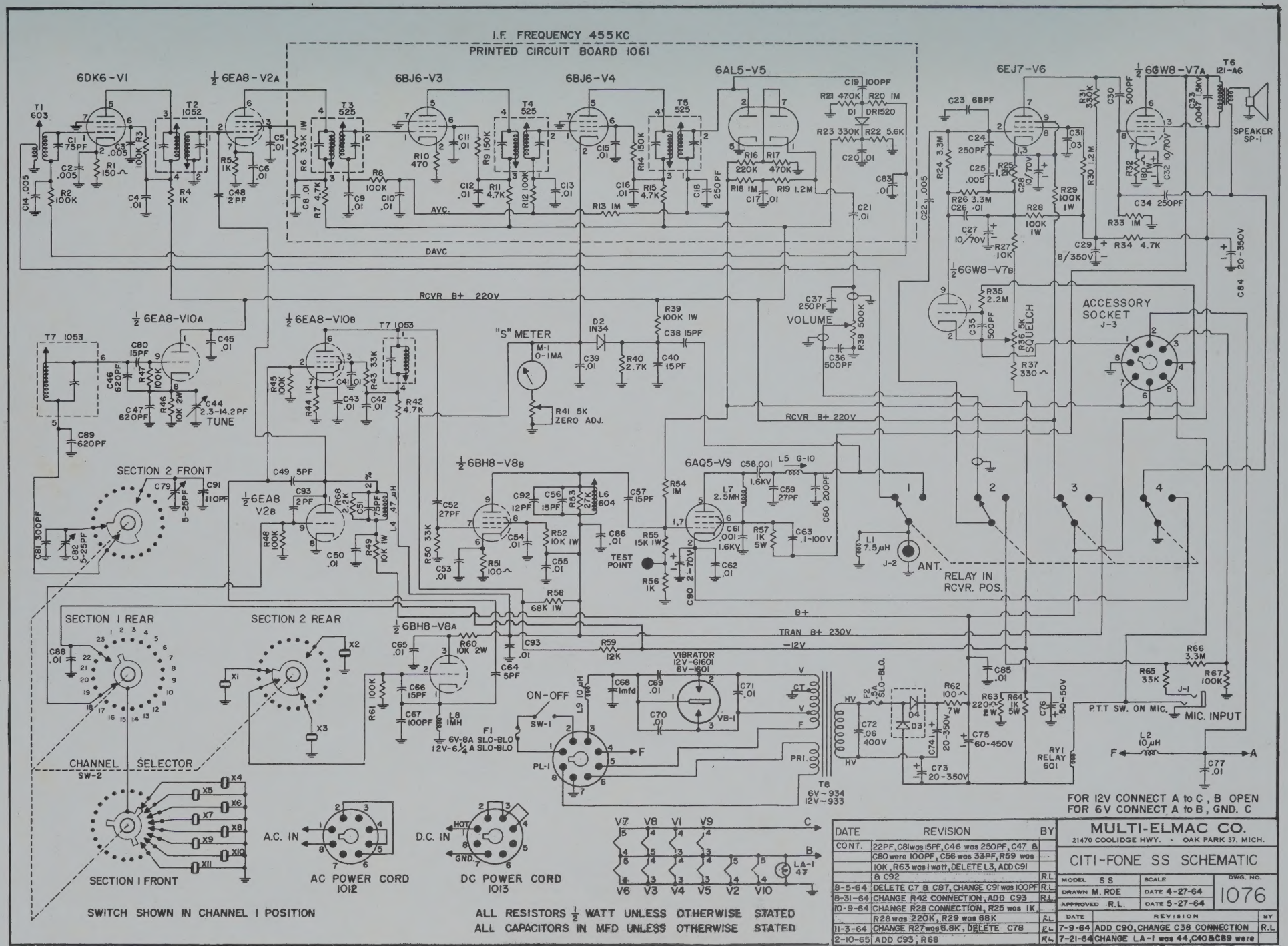
All voltage measurements made with respect to chassis using a Simpson model 270 multimeter, 20,000 ohms per volt. VTVM used where shown.

RESISTANCE CHART

Pin #	1	2	3	4	5	6	7	8	9
V1 6DK6	1.2M	150	.3	.3	35K	135K	0	-	-
V2 6EA8	44K	0	70K	0	.3	40K	1K	0	140K
V3 6BJ6	1.7M	500	0	.3	40K	190K	0	-	-
V4 6BJ6	160K	81K	0	.3	40K	190K	0	-	-
V5 6AL5	2.9M	440K	0	.25	0	0	350K	-	-
V6 6EJ7	12K	7M	12K	0	.3	-	370K	1.25M	12K
V7 6GW8	2.6M	†	35K	.3	.25	36K	180	1M	3.2M
V8 6BH8	18.5	100K	87K	.25	.3	100	34K	87K	76K
V9 6AQ5	15K	open	.3	.25	36K	36K	15K	-	-
V10 6EA8	46K	105K	70K	0	.3	40K	1K	18.5	105K

All measurements made, with respect to chassis, using a Simpson (Model 270) multimeter

† - Depends on squelch control setting, CW-550, CCW-5.5K



DATE	REVISION	BY
CONT.	22PF, C81 was 15PF, C46 was 250PF, C47 & C80 were 100PF, C56 was 33PF, R59 was 10K, R63 was 1 watt, DELETE L3, ADD C91 & C92	R.L
8-5-64	DELETE C7 & C87, CHANGE C91 was 100PF	R.L
8-31-64	CHANGE R42 CONNECTION, ADD C93	R.L
10-9-64	CHANGE R28 CONNECTION, R25 was 1K, R28 was 220K, R29 was 68K	R.L
11-3-64	CHANGE R27 was 6.8K, DELETE C78	R.L
2-10-65	ADD C93, R68	R.L

MULTI-ELMAC CO.
21470 COOLIDGE HWY. • OAK PARK 37, MICH.

CITI-FONE SS SCHEMATIC

MODEL	SS	SCALE		DWG. NO.
DRAWN	M. ROE	DATE	4-27-64	1076
APPROVED	R.L.	DATE	5-27-64	

DATE	REVISION	BY
7-9-64	ADD C90, CHANGE C38 CONNECTION	R.L
7-21-64	CHANGE LA-1 was 44, C40 & C89 were	

OWNERS WARRANTY

All equipment manufactured by the Multi-Elmac Co. has been thoroughly tested and shipped from the factory in proper operating condition. This equipment is guaranteed to be free from any defects in workmanship and/or material for a period of 90 (ninety) days from date of original purchase as follows: Any part or accessory except tubes, crystals and other trade articles not of our manufacture, shall be replaced free of charge providing the defect is in our opinion due to faulty workmanship and/or material, and not caused by tampering, abuse or normal wear. Tubes, crystal and other trade articles not of our manufacture are generally guaranteed by their respective manufacturers. The Multi-Elmac Co. will act as agent of these manufactures in replacing such parts provided that such parts are returned to us pre-paid with a period of 90 (ninety) days from date of original purchase by the owner. The replacement of such parts will be in accordance with the warranty of the respective manufacturers. No further guarantee or warranty is implied. In accepting delivery, the purchaser assumes full responsibility for proper installation and service arrangements.

This warranty is valid only if the Owner's Registration Card has been filled out by the purchaser and mailed to the Multi-Elmac Co. at the time of original purchase.

This warranty is void if the equipment has been modified or if failure is due to the application of voltages other than those specified in this manual.

Do not return any equipment or accessory direct to the factory without first obtaining authorization from the factory. All equipment to be returned shall be shipped pre-paid and insured by the owner.

Any claims for damage or loss in transit must be filed with the carrier. The Multi-Elmac Co. will give any necessary assistance in filing such claims.

The Multi-Elmac Co. reserves the right to make changes in current production models without being obligated to incorporate such changes in earlier production models.

Multi-Elmac Company